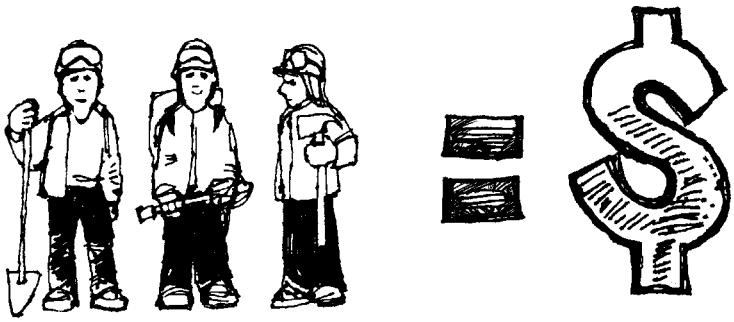
FIREFIGHTING COSTS MONEY!



SUBJECTS: English/Language Arts, Mathematics, Social Studies, Health, Physical Education, Practical Living/Vocational Studies

GRADES: 4-8

DURATION: one class period

GROUP SIZE: one class of 25-30 students

SETTING: Outdoors or in the classroom

KEY VOCABULARY: Nomex, fire shelter, MRE, flagging, McLeod, Pulaski, fusee, drip torch, logistics, retardant, firebreak

ANTICIPATORY SET: Just like any other specialized occupation, when men and women work on prescribed burns or fight wildland fires, they require special clothing and equipment in order to be efficient and safe. Have you ever thought of the cost to outfit just one firefighter? How do these men and women obtain their equipment? How do they get to the fire? How do they get their food and showers when they're in the middle of the wilderness? Where do they sleep? Firefighters are just one part of a team that is needed to coordinate the efforts that go into controlling a fire. This lesson will introduce students to a few of the more then 240 wildland fire occupations.

OBJECTIVES: Students will 1) recognize and become familiar with personal protective equipment; 2) be exposed to hand-held firefighting equipment; 3) recognize that safety is the number one priority for all firefighters; and 4) realize that firefighters are only one element of a team.

MATERIALS:
- Fire box containing firefighter clothing and equipment
- National Fire Equipment System Catalogs
- Supplies Resource Order form
- Pencils
- Fire Shelter

BACKGROUND:
When a prescribed burn is planned or when a wildland fire is reported, teams of fire experts are called in to oversee and organize the men and women who will be working to contain the flames. An **incident commander** is the person in charge. He or she will head a team who makes decisions regarding the logistics of fighting the fire. These decisions include the number of people needed, the placement of these people on or near the fire, the use of specialized equipment, the safety of people and buildings, payment of salaries and supplies, and obtaining basic services such as food, medical care, radios, showers, and firefighting supplies. Before firefighters can be sent to a fire someone must make travel arrangements. Some people will drive their car or truck to the incident. A bus may be hired, or, depending upon the size of the fire and the distance the firefighters must come, plane tickets or rental cars must be obtained. Upon arrival at the fire, will these firefighters need hotel reservations or will they be sleeping in tents at a base camp? Once at the fire, the **supply officer** will order sufficient shovels, uniforms, first aid kits, helmets, radios, weather kits, batteries, pumps, water hoses, screwdrivers, pencils, chainsaws, gloves, and tool kits needed for the firefighters to do their job. In addition, meals, drinking water, portable toilets and even showers may be requested.

Dispatchers are the people who make the travel arrangements and find the needed people, supplies, and equip-

ment. They also keep track of every person and piece of property. When the fire is over, the dispatchers will either send the people and equipment home, or they may send them to another fire. **Time keepers** record the number of hours that each firefighter works so they can be paid correctly. They also track the number of hours different machines are used. Machines and equipment may not be paid, but very often they need to go for a "check-up" after so many hours of usage. This is particularly important for aircraft that may be carrying firefighters into remote areas or flying over fires to drop retardant! **Pilots** and **crewmembers** are needed to fly these fixed-winged planes and helicopters. **Radio operators** keep in constant contact with everyone on the ground and in the air.

Photographs of firefighters at work are taken by the **Information Officer (IO)**. The IO also writes news articles which describe the fire and detail the progress in putting it out. **Firefighters** are usually photographed using various types of shovels, rakes, and chainsaws. These are the standard tools used to fight a wildfire, to clear an area of available fuel, or to make firebreaks. However, specialized firefighters may be called in to help. **Smokejumpers** are highly trained firefighters who parachute from an airplane to reach fires in remote or inaccessible wilderness areas. They are usually the first firefighters on the scene and may be many miles from the nearest help! A **Fire Crew** is a group of 20 firefighters who operate as a team. Type I crews have trained together all during the year, even during the months when there are no fires to fight! Type II crews are made up of trained individuals who may have never worked together before. The size and danger posed by an individual fire will determine which fire crew is used. Fire crews are under the direction of crew bosses. **Crew bosses** must have a lot of experience as they not only direct the actions of the crew while on the fire line, but they must also keep track of changing weather conditions, fire activity, and are ultimately responsible for the safety of their crew members. **Tractor and plow operators, water handling specialist, and dozer bosses** all operate the heavy machinery that helps clear areas with heavy undergrowth.

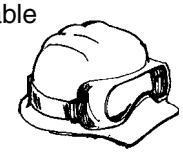
Every person working on or near a fire - from firefighter to time keeper - must be safe. To prove they are physically fit, all personnel who may be sent near the fire line must pass a pack test. A **pack test** will check their stamina and endurance. To pass, the firefighter must carry a 45-pound backpack for 3-miles in 45 minutes or less (without running!) In addition, everyone associated with a fire wears Nomex (fire-retardant) clothing and keeps specialized gear handy "just in case". Specialized clothing includes:

- **Clothing** – The long-sleeved fire shirt and the loose-fitting, cuffless fire pants are both made of a fire-resistant Nomex material. The shirt is bright yellow for easy visibility and the long sleeves are kept rolled down! The fire jeans are made with many large pockets to carry items the firefighter must have handy. Underwear must always be 100% cotton since synthetic materials such as nylon and rayon can melt and stick to the skin in extreme heat!

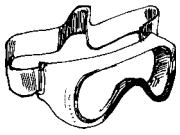
- **Boots** – Heavy-duty, laced, leather boots with 8-inch tops provide ankle support while non-skid soles provide good traction on steep terrain. Each firefighter must purchase their own boots. Boots cost $85 - $350 per pair.

- **Heavy-Duty Leather Gloves** – protect the firefighter's hands.

- **Hardhat** – This helmet is made of durable fiberglass. It protects the firefighter's head from sparks and falling debris. Like the fire shirt, it is a bright yellow so the firefighter is easily seen, even in wooded areas or in thick smoke.



- **Goggles** – protect a firefighter's eyes from the heat, smoke and soot, or other debris in the air.



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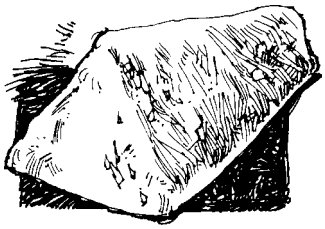
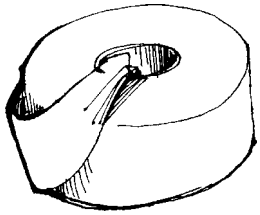
Each firefighter must carry certain equipment and supplies at all times while fighting a fire. These items may include:

- **Field Pack** – (firefighter, unisex, complete) is worn on the back and is designed to carry all necessary gear.
- **Fire Shelter** – The fire shelter is kept within reach at all times. It is made of fiberglass and aluminum. When opened, the shelter wraps around the firefighter like a cocoon and can reduce the radiant heat from a deadly 1,000-degree fire to a survivable 120 degrees. It also provides a temporary pocket of breathable air during fire-entrapment situations. The fire shelter can mean the difference between life and death, and is kept in a plastic case until needed.

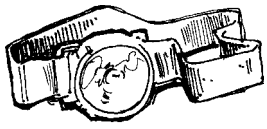


- **Canteen** – dehydration is always a danger. Wildland firefighters carry at least two quarts of water in their pack. Some carry more!
- **Earplugs** – can provide protection from loud sounds, debris, and dirt stirred up by fires.
- **Handbooks** – Reference books provide needed information on techniques, safety measures, and task responsibilities. Every firefighter is issued a copy of the "Fireline Handbook".
- **Map and Compass** – The firefighter will probably be working in unfamiliar territory. To locate the fire, to plan the best route of travel, and to locate homes that may be threatened, a marked map of the region and a compass are essential tools!
- **First Aid** – Basic first aid supplies (including a lip balm, moleskin to take care of blisters, insect repellant, and personal medications) are useful and sometimes essential!
- **Toilet Paper** – Some things are always necessary!
- **Food** – Firefighters use a lot of calories during the day. Meals-Ready-to-Eat (MRE's) are balanced, high-calorie meals that can be easily carried in a backpack or pocket. Extra snacks help keep their energy level high.

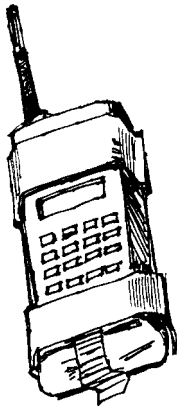
- **Flagging Ribbon** – Brightly colored tape is used for quick identity (each person carries at least two colors). They are used to mark safety routes away from the fire, to mark work areas, to mark hazards, or to identify unstable (killer) trees.



- **Space Blanket** – A thermal space blanket is both waterproof and windproof. It protects firefighters from wind, rain, or cold weather.
- **Brush Coat** – Made of cotton and fire-resistant Nomex with reflective stripes, these coats are usually used only when the temperatures drop (on night shifts, in camp, or during dawn briefings). They provide protection from flames, but are usually too bulky and hot to wear while fighting large wildland fires during the day!
- **Headlamp** – Lights the way after dark and leaves the hands free to work. Don't forget to pack four extra batteries!



- **Radio** – Communication with headquarters and other fire crews is essential! Radios allow firefighters to hear updated weather reports, changes in fire plans, and allows them to report changing or dangerous conditions.



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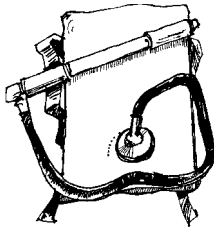
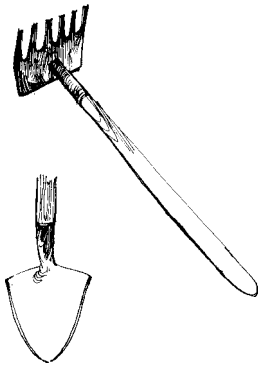
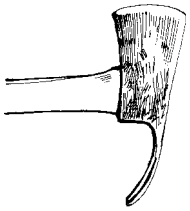


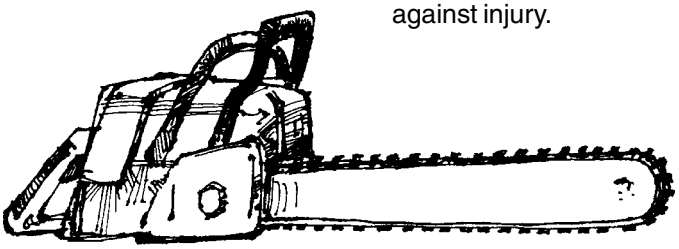
- **Bladder Bag** – A backpack pump that can hold up to 5-gallons of water. Water can cool flames before digging.
- **Tool** (combination shovel and grub hoe) – Combination tools allow firefighters to do a variety of jobs while carrying a minimum amount of equipment.

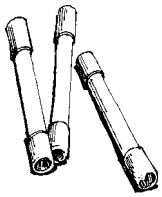


- **McLeod** – Used to rake flammable materials away from the fire and to move smoldering logs during mop-up. The McLeod is used extensively in the western United States.
- **Shovel** – Used for digging, scraping, and spreading loose dirt over small flames.
- **Rake** – used primarily in Eastern forests where thick layers of leaves and twigs need to be cleared from firebreak areas.



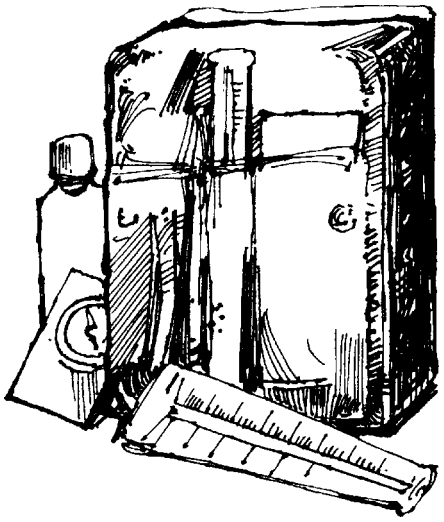
- **Pulaski** – A chopping and trenching tool that combines an axe blade with a narrow, adze-like blade.
- **Chain Saw** – Useful for moving or cutting trees while making a firebreak. Chain saw operators must wear thick chaps (leg guards) to safeguard against injury.





- **Fusee** – These are like flares that burn extremely hot. They are used to start backfires or prescribed burns. They are designed to ignite in all weather conditions. They have a delayed fuse to prevent injuries.

- **Drip Torch** – This small, handheld fuel can drips a burning mixture of diesel fuel and gasoline. The can has a handle, nozzle and igniter. It is used to start backfires or prescribed burns.
- **Belt Weather Kit** – All firefighters must watch for changing weather conditions. The belt weather kit contains an anemometer, phychrometer, compass, and small bottle of water to take wind direction, wind speed, temperature, and relative humidity readings.



PROCEDURE:

When firefighters report for duty, they must be completely outfitted and ready to work.

1. Using items found in the fire box, describe and show each article of clothing and tool to the class. Tell why each item is important for the job or for safety. Show how to use the tools.

2. Next, show the class the firefighters backpack. Describe and show the items carried inside the backpack. You may like to have a student volunteer put on and/or hold the items as you describe them. Are the equipment and safety articles easy to wear and carry?

3. How much do all the items weigh? Explain to the students that firefighters need to know their total weight. If they are transported by airplane, the airplane will have a weight limit. Each firefighter will be weighed with all his/her clothing and gear. A 20-person crew is allowed 4,800 lbs. (including people and gear). How much weight allowance is each person allowed? How much does the average firefighter weigh? [185-lbs.] How much weight is available for his/her professional and personal gear? If the firefighter is carrying too much weight they will need to leave items behind. For this reason, firefighters become expert at estimating their weight. Have each student estimate the total weight of the items shown. Record the guesses on the board. (HINT: The firefighter shirt weighs 1 pound.)

Have students calculate the cost to outfit a firefighter.

4. Allow students to work in pairs or in small groups. Give each group of students a copy of the "National Fire Equipment System Catalog" and a copy of the Supplies Resource Order form.

5. Ask students to open the catalog to the section marked "Alphabetical Section". Review with students the procedure for finding items alphabetically. Point out that each entry will have a catalog number, a name, details such as size or length, the weight (listed as WT:), and volume (listed as CU: __ ft). The last line of each entry contains a series of three capital letters. These letters give the location (regional cache or warehouse) from which the item can be ordered. [Note: only fire Supply Officers can order from this catalog.] To the right of this description you will find the price. The price is related to the unit of issue. That information is located along the far right side of the page. Most items are sold EA (each), although you may also find items sold in a RO (roll), as a PR (pair, i.e., a pair of gloves or a pair of jeans), in a PG (package), or by the BX (box of so many). See pages 54 and 55 of the 2001 catalog or page 43 in the 1999 catalog for detailed explanations.

6. Review the various columns on the Supply Resource Order form. Be certain the students know how to find the required information. You might list on the board page numbers of some specialty items:

Item	***2001 Catalog page #***	***1999 Catalog page #***
Pocket first aid kit	211	182
Fireline Handbook	321	311
Belt Weather kit	204	174
Command/Tactical Radio Kit (for 16)	249	227

7. The students will now become fire Supply Officers. Tell the students to complete their Supply Resource Order form in order to outfit a new firefighter with all the required clothing displayed in class, all the items found in the backpack, one drip torch, and one tool of their choice from the above list.

8. Have the students calculate the total cost of outfitting this new firefighter. This firefighter is one member of a 20-person crew. How much would it cost to outfit the entire crew?

9. Would you like to wear this one outfit every day for your 14-day tour of duty? How could you get clean clothes? Allow students to brainstorm. Some possibilities would be to carry several outfits or to wash your clothes after work. What are the advantages or disadvantages of these choices. On many fires the Supply Officer will set up a laundry service. After working all day, the firefighters can exchange their dirty clothes for a clean outfit. The laundry service then washes the dirty clothes for exchange the next day. This goes on until the fire is put out.

10. What is the total weight of all these items? Compare this weight with the estimates made at the beginning of class. Were any guesses accurate? Would you get tired carrying that many pounds for 10-hours each day?

11. Even though they expect to be at a fire for 14 days, firefighters are not allowed to carry more then 65 pounds of gear to the fire. Look at the total weight of the items you have just ordered for your firefighter (including the weight of the pack). If these items were for you, what would you add to your pack if you have some extra weight allowance available? How many sets of clothing will you pack? [Don't forget off-duty entertainment – will you read a book, write a letter, or play cards? Will you bring your own pillow, a favorite snack, long-johns or extra underwear? How much will your sleeping bag (4-lbs, 12-oz.) and tent (7-lbs) weigh? All these items must be included in your 65-pound limit!]. If you are overweight, what will you leave behind? Remember, you must be able to do your job and remain safe!

CLOSURE: The proper clothing and equipment can cost a lot of money. But not having the proper items can be even more costly if someone becomes seriously injured or dies. Safety is always more important then cost.

EVALUATION: The teacher will be able to: 1) evaluate student comprehension and participation through class discussions; 2) evaluate problem solving abilities through the "what if" questions and answers; and 3) evaluate student worksheets for correct information and calculations.

EXTENSIONS:

1. If there is a local prescribed burn or a wildland fire in the news, have the students find out the number of people assigned to that fire. Based on their class calculations, how much did it cost to outfit all the people working on that fire for just one day?

2. Invite a Forest Service or National Park ranger to your classroom to discuss their experiences on a wildland fire or with a prescribed burn. Ask the ranger to demonstrate the correct usage of the various tools. If there is an appropriate place on the school grounds, allow students to use each of the hand tools.

3. Demonstrate the correct procedure to deploy a fire shelter. Students can practice using a fire shelter. Allow groups of 4-6 students to run 30-50 yards, open their fire shelter, get situated inside and hold the shelter down while you shake the tents to simulate strong fire winds! To survive, they would need to do all that in 30-seconds or less!

4. Ask students if they would be interested in working on a wildland fire or on a prescribed burn. There are over 200 possible wildland fire positions. Students could choose a fire position/job that interests them. Using the Internet and other resources, have students research the duties and responsibilities of their chosen position/job. What specialized training (if any) is required for this position/job? Have students share their findings orally or organize their written reports into a classroom "fire careers" book.

5. Have the class train to pass the walking part of the "pack test". Students "pass" when they can walk 3 miles in 45-minutes.

6. Ask a member of your local volunteer fire department to come to class and explain the clothing and equipment used during a structure or field fire in your neighborhood. Compare his/her clothing and equipment with that used by wildland firefighters. Why do you think their gear and clothing is so different? What are the advantages and disadvantages of each? Do you think the volunteer fireman would be as efficient or as safe if he/she dressed in and used the wildland fire equipment while fighting a house fire? Why or why not? What would happen to a wildland firefighter if he/she tried to fight a forest fire while wearing the volunteer fireman's clothing?

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SUPPLY RESOURCE ORDER FORM

RESOURCE ORDER SUPPLIES	DATE:	ORDERING MANAGERS:			
RESOURCE NUMBER	RESOURCE NAME	QUANTITY	PRICE EACH UNIT	TOTAL PRICE	WEIGHT
0065	Fireline Handbook	1	$2.43	$2.43	10 oz.
				TOTALS:	